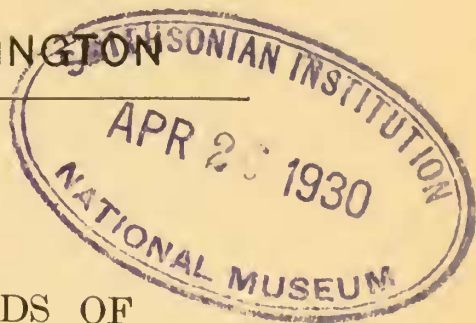


PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON



A REVISION OF THE LOCO-WEEDS OF
WASHINGTON.¹

BY HAROLD ST. JOHN.

The loco-weeds are very well known and abundant in the Rocky Mountains and on the Great Plains to the east of them. There they have gained a very unfavorable prominence, due to certain poisonous properties. If a grazing animal eats of the loco-weed, it soon develops a craving for the plant, will seek it out, and eat but little else. A poisonous drug in the plant affects the nervous control of the animal, causing it to move in a crazy manner when walking or running. From this fact, the affected animal is said to be locoed, a word from the Spanish *loco*, meaning crazy. The craving for the drug is so strong, that the animal eats of it until it produces a sorry plight and finally causes death. Several species of plants are known to cause this trouble. A few are members of *Astragalus*, the milk vetch, and others are of unrelated genera. The best known species, however, are in the genus *Oxytropis* (*Aragalus*). In the present paper, the common name loco-weed is applied to this latter genus only.

The species of *Oxytropis* are distinctly rare in the state of Washington. Most of the early explorers in this part of the Pacific Northwest missed them entirely, but the intrepid and keen-eyed Douglas was one of the few to detect the plant. He records² his No. "(28) *Oxytropis Lambertii*; abundant in rocky, sandy situations; grows very luxuriant on limestone hills from the Great Falls upwards; at the mouth of the Spokane River a variety, or may prove a second species, is found of

¹Contribution from the Botany Department of the State College of Washington, No. 12.

²Journ. by David Douglas, 164. 1914.

more slender growth; not so silky; the calyx longer and not swollen."

There are no limestone hills near the Great Falls, or The Dalles as they are now called, nor has the genus been found since in that vicinity. However, it has been found along the Columbia River not very far from the mouth of the Spokane River. Hooker in his *Flora Boreali-Americana* does not list any Douglas collection from either of these areas. *Oxytropis Lambertii* is not now known from Washington or from near its boundaries. Douglas may have mistaken a species of *Astragalus* for the plant in question, though on page 172 he lists a plant as *Oxytropis* or *Astragalus*. It is obvious that he was familiar with the two genera, so it is probable that he did find at least one of the loco-weeds within the boundaries of what is now Washington.

In the Botany of the Wilkes Expedition, Torrey recorded¹ *O. Lambertii* from "Interior of Washington Territory and Oregon." Due to the facts that the material was in fruit only, and that no definite locality is given, and to the well-known fact that the data on many of these specimens has been confused, the writer does not hesitate to reject this record. None of the other early explorers seem to have detected the plant.

In 1899 Dr. Aven Nelson described² an *Aragalus gracilis* from Wyoming, adding that he thought that *Elmer* 595 from Loomiston, Wash., must be referred to the same species. Some years later when he reviewed the group³ and transferred the species to the genus *Oxytropis*, Dr. Nelson stated that the species was confined to Wyoming, Colorado, and the Black Hills region, thus excluding *Elmer's* Washington collection. He has also replied to a recent inquiry from the writer that this is his present understanding of the group. At this place it is a pleasure to record with thanks the loan by Dr. Nelson of the material including the type of *Oxytropis gracilis* (A. Nels.) K. Schum., from the Rocky Mountain Herbarium, University of Wyoming.

The only species that has been founded on Washington material is *Aragalus luteolus* Greene. This was described⁴ in

¹U. S. Expl. Exped. 17: 279. 1874.

²Erythea 7: 60-61. 1899.

³U. Wyo. Publ. Bot. 1: 116. 1926.

⁴Proc. Biol. Soc. Wash. 18: 17. 1905.

1905 by Dr. E. L. Greene, and was based on an Elmer collection from the Olympic Mountains.

Prof. C. V. Piper listed in his Flora of Washington¹ in 1906 two species of *Aragalus*. The first he called *A. gracilis* A. Nels., listing under it the two *Elmer* collections, 595 from Loomiston and 2532 from the Olympic Mountains. The second is called *A. monticola* (Gray) Greene.

In a later joint work² with Prof. R. K. Beattie, Prof. Piper adopted the generic name *Oxytropis* for this group. For the first species he adopted Greene's name *luteolus* and made the combination under *Oxytropis*. This should be corrected to read *luteola*, so as to be in agreement in gender with the generic name. For the second species, occurring in the Olympic, the Cascade, and the Blue Mountains, he adopted the name *O. Cusickii* Greenm. This completes the review of the past treatment of the Washington species of *Oxytropis* or loco-weed. In studying them the writer has had access to the type of *O. gracilis*, to two duplicate types of *O. luteola*, and to authentic cited material of *O. Cusickii*, distributed by Cusick.

Since the loco-weeds are a serious menace to grazing animals in a large part of the west, and even as near as in Montana, a search has been made for reports of any loco-poisoning in Washington. No such records could be found at the State College of Washington or the Agricultural Experiment Station at Pullman, or at the Forest Service District Office in Portland, or at the State Dairy and Livestock Office in Olympia. To one knowing the distribution of the loco-weeds in the State of Washington, this fact is not surprising. Localities and collections are few, and most of these are from the alpine regions of certain of our mountains that are never, or very seldom, visited by range animals. In one part of the range country, however, the loco-weeds are fairly abundant at moderate elevations. This is on the limestone and magnesian limestone outcrops of Okanogan and Stevens Counties. Hence, if our species have the same poisonous properties of the tested species of this genus, trouble may very likely occur in this area.

The writer recognizes a much larger number of species of loco-weeds in Washington than has been done by his predeces-

¹Contrib. U. S. Nat. Herb. 11: 367. 1906.

²Fl. of the Northwest Coast, 227. 1915.

sors. All but one are most closely related to *Oxytropis gracilis* and like it are in the section *Campestres*. The solitary one is from Marcus. It also is a member of the section *Campestres*, though it does not seem to have any close relatives.

The characters found most useful in separating the following species are in the shape and pubescence of the stipules. It is of interest that the shape and size of the wing of the flower is so distinct in each of the species, that they could be distinguished on this basis alone.

KEY TO WASHINGTON SPECIES OF OXYTROPIS

- A. Flowers white, blue-veined, the keel bluish-purple-maculate below the apex.....*O. columbiana*
- A.' Flowers yellowish,
 - B. Stipules glabrous on the back.....*O. mazama*
 - B.' Stipules more or less pubescent on the back,
 - C. Stipules densely appressed long pilose dorsally, especially towards the base, leaflets 9–30 mm. long.....*O. okanoganea*
 - C.' Stipules at least sparsely pilose dorsally towards the apex, leaflets not over 15 mm. long,
 - D. Calyx at anthesis 9–10 mm. long, leaflets 21–27,
 - E. Stipules generally pilose dorsally, flowers 13–14 mm. long
O. olympica
 - E.' Stipules pilose mostly along the midrib towards the tip, flowers 15–17 mm. long*O. luteola*
 - D.' Calyx at anthesis 7–8 mm. long, leaflets 18–21.....*O. cascadiensis*

***Oxytropis columbiana*, n. sp.**

Caespitose herbaceous perennial; tap-root erect, bearing a multicapital crown; leaves numerous, very white when young but at maturity greenish; stipule adnate to the base of the petiole broad scarious rather generally white appressed pilose, each half deltoid, attenuate into a long caudate tip with a raised midrib; petioles long appressed white pilose, 2–5 cm. long; the blades abruptly or more commonly odd pinnate, the upper leaflets paired and equal, the lower alternate and often unequal in number, leaflets 17–21, narrowly elliptic- or oblong-lanceolate acute, the margins somewhat inrolled, pilose with soft long white appressed hairs, blade of leaflet 8–20 mm. long, 2–5 mm. wide; scapes numerous equaling or slightly exceeding the leaves at anthesis, about 15 cm. long, but in fruit about 20 cm. long, appressed white pilose below, but with the hairs more spreading above and often with an admixture of short black hairs; spike short and head-like, but by fruiting time elongating to 3 or 5 cm.; bracts linear-lanceolate, pilose but green, the lower equaling or nearly equaling the calyx; calyx narrowly campanulate, densely white appressed pilose or with a few short black hairs, 9–10 mm. long, the teeth subulate 2–3 mm.

long; flowers about 20 closely massed, ascending, 15–16 mm. long; corolla white, with delicate blue veins, the keel with a large bluish-purple blotch just below the apex; standard narrowed to the base, but oblong above, emarginate, bisulcate and reflexed; wings 13 mm. long with a slender claw nearly as long as the blade, the blade cuneate-oblong, with a small terminal and a large basal lobe on the upper side, with a narrow saccate infolding diagonally placed above the base of the basal lobe; keel with a broad claw exceeding the blade, the blade folded, sagittate, with rounded basal lobes and an apiculate tip; pod sessile oblong or lanceolate in outline, attenuate into a slender beak, appressed white pilose, the upper suture intruded a short distance, ovules numerous.

Perennis subacaulis, foliolis anguste oblongo-lanceolatis pilosis, floribus subcapitatis albis caeruleo-maculatis vel nervosis 15–16 mm. longis.

WASHINGTON: gravelly beach of the Columbia River, Marcus, Stevens Co., June 27, 1924, *Harold St. John* 6482 (type in Herb. State College of Washington).

The new *O. columbiana* falls into the section *Euoxytropis* and the series *Orobia* of Taubert's arrangement in Engler und Prantl's Pflanzenfamilien and into the section *Campestres* of Rydberg's treatment in his Flora of the Rocky Mountains. It is so different from the various North American species as not to require any statement of contrasting differences.

***Oxytropis mazama*, n. sp.**

Caespitose herbaceous perennial; tap-root erect, branching above and multicapital; leaves few and sparse, green; stipules adnate to the petiole white and scarious glabrous on the back, each half deltoid with a short caudate tip and one prominent nerve, leaves small, appressed white pilose throughout, but greenish; petioles 1–3 cm. long; blades odd pinnate; leaflets 17–25, the upper pairs opposite, the lower more or less so, linear to oblong-lanceolate, the margin somewhat inrolled, 4–11 mm. long, 1–4 mm. broad; scapes exceeding and often twice the length of the leaves, appressed white pilose below, and above or with a more conspicuous short black appressed puberulence above; spike short and capitate, 5–10-flowered bracts lanceolate, green, more than half the length of the calyx; flowers yellowish, narrow ascending, 15 mm. long; calyx narrowly campanulate, appressed pilose, these hairs mostly black at anthesis but at fruiting time mostly white, sepal-lobes linear-lanceolate 1–2 mm. long; keel folded and the tip bent upwards, the claw oblong twice exceeding the blade, blade shield-shaped with two minute basal auricles, tip apiculate; wings 12 mm. long, the claw slender straight, equaling the blade, the blade oblong-cuneate, rounded truncate above, with auricle-like lobes at each end on the upper side, a saccate infolding placed longitudinally above the base of the basal auricle; standard with a short cuneate claw, the blade bisulcate, somewhat reflexed, oblanceolate emarginate; pod sessile, lanceolate in outline, slender beaked, strongly ascending, white and black appressed pilose, 1–2 cm. long, the upper suture somewhat intruded, ovules numerous.

Perennis subacaulis, stipulis glabris ciliatis, foliolis 17–25 lineari- vel

oblongo-lanceolatis, scapis valde folio longioribus, floribus ochroleucis, leguminibus pilosis.

WASHINGTON: clefts of rocks, alt. 6000 ft., Goat Mountains, July 6 and September 30, 1896, *O. D. Allen* 245 (type in Herb. State College of Washington); summit of Mt. Wow, Rainier National Park, September 20, 1919, *J. B. Flett* 3126; Olympic Mts., September, 1915, *J. M. Grant*. The last specimen, which is in the Rocky Mountain Herbarium, is more abundantly white pilose, has fewer black hairs, and somewhat narrower leaflets, but it seems conspecific with the above.

The specific name is the noun *mazama* used in apposition. It was formerly the technical name of, and is still used popularly for the mountain goat of the Pacific Northwest. *O. mazama* is, according to Taubert's treatment in Engler und Prantl's Pflanzenfamilien, a member of the section *Euoxytropis* and of the series *Orobia*. By Rydberg's treatment it is a member of the section *Campestres*. It is most closely related to *O. gracilis* (A. Nels.) K. Schum., which has the bracts lanceolate equaling the calyx, and the lower even equaling the flower, flowers 15-25, besides being a taller stouter plant and with a number of other technical characters *O. mazama* St. John has the oblanceolate bracts shorter than the calyx, the flowers 5-10, and the leaflets not exceeding 11 mm. in length. *O. Rydbergii* A. Nels. (*A. alpicola* Rydb.) is a small mountain species with decumbent curved scapes 2-6 cm. long.

***Oxytropis okanoganea*, n. sp.**

Perennial acaulescent herbs; tap root slender and vertical, branching above and multicapital; leaves rather few from each crown, pale whitish green, large; stipules adnate to the petioles, white and scarious, densely long white appressed pilose below, each half deltoid and with a long slender linear caudate tip, with one prominent raised nerve, more or less pilose above at least along the nerve; petioles densely white appressed pilose, 3-8 cm. long; blades rather large, appressed white pilose throughout; leaflets 13-21 odd pinnate, the upper pairs opposite, the lower nearly so, lanceolate, 9-30 mm. long, 2-4 mm. wide, the margins inrolled; scapes several, exceeding the leaves at anthesis, markedly white pilose, the hairs appressed or some of them spreading or ascending as well as somewhat appressed soft pilose above; spike compact at first, but before the close of anthesis elongate and loose, and at least the lower flowers well spaced; bracts lanceolate white pilose, at least the lower equaling the calyx; flowers 10-22 pale lemon yellow 15-20 mm. long, ascending; calyx narrowly campanulate, 8-10 mm. long, white somewhat appressed villous and often with a few short black hairs, the sepal-lobes subulate 2-3 mm. long; standard spatulate, with the broad claw gradually blending into the blade, blade broadly emarginate bisulcate and somewhat reflexed; wing with a very slender linear claw equaling the blade, the blade broadly cuneate oblong, the apex with two broadly rounded divergent equal lobes and three smaller rounded ones in the deeply emarginate tip, the basal auricle prominent and 2 mm. long, a linear infolding of unaltered tissue placed

longitudinally above the base of the basal auricle; keel with a broad oblong claw much exceeding the blade, the blade infolded and bent upwards shield-shaped with small rounded basal auricles and an acicular caudate tip; legume lanceolate in outline, caudate beaked, white appressed pilose, sessile, the upper suture somewhat intruded, ovules numerous.

Perennis acaulis, stipulis ad basim valde pilosis, foliis 13–21 lanceolatis 9–30 mm. longis, scapis subappresso-pilosis foliis valde longioribus, floribus ochroleucis 15–20 mm. longis, legumine lanceolato piloso.

BRITISH COLUMBIA: Clinton, Aug. 25, 1918, *W. B. Anderson* 851; Kamloops, May 25, 1919, *W. B. Anderson* 853; Lytton, May 27, 1918, *W. B. Anderson* 851.

WASHINGTON: limestone shingle, border of small alkaline pond, plateau n. w. of Riverside, Okanogan Co., July 2, 1923, *Harold St. John* 7728 (type in Herb. State College of Washington); flowers pale lemon yellow, limestone shingle of alkaline pond, plateau n. w. of Riverside, Okanogan Co. July 1, 1923, *H. St. John* 7703; in meadows on the s. e. slope of mount Chopaca, alt. 4000 ft., Loomiston (Loomis), Okanogan Co., August, 1897, *A. D. E. Elmer* 595; common, sandy soil, south slope, open country, 1200 ft. alt., Osooyos Lake, Okanogan Co., *W. B. Anderson & G. V. Copley* 7944.

The specific name is taken from the Indian name Okanogan for the dry rolling country, much of which is drained by the Okanogan River. This name has been preserved by the white settlers on the Canadian side of the line, and also on the American side, where it is also the official name for the county. *O. okanoganea* is a member of the section *Euoxytropis* and the series *Orobia* according to Taubert's treatment in Engler und Prantl's Pflanzenfamilien, but by Rydberg's treatment it is of the section *Campestres*. The new species most closely resembles *O. gracilis* (A. Nels.) K. Schum., which has the stipules glabrous or glabrate on the back, leaflets 21–31 bright green and sparsely pilose. *O. okanoganea* has the stipules densely long pilose, leaflets 13–21 pale green and markedly appressed white pilose. *O. saximontana* A. Nels. has the scapes equaling the leaves, smaller more oblong leaflets, the flower 20–25 mm. long, and the pod oblong or ovoid twice the length of the calyx. *O. okanoganea* has the scapes distinctly exceeding the leaves, leaflets lanceolate, the flowers 15–20 mm. long, and the pod three to four times the length of the calyx.

***Oxytropis olympica*, n. sp.**

Caespitose herbaceous perennial; tap root branching and bearing a few small crowns; leaves few and sparse, whitish green; stipules adnate to the base of the petioles, broad scarious, each half broadly deltoid and short acuminate, sparsely appressed white pilose over the back; petioles densely appressed white pilose, 2–3 cm. long; leaflets 23–27, odd pinnate the upper pairs opposite, the lower nearly so, lanceolate acute, the margins inrolled, densely appressed white pilose, 2–8 mm. long, 1–2 mm. wide; scapes several exceeding the leaves, densely white more or less appressed pilose; spike short cylindrical 1.5–3.5 cm. long, 7–15-flowered; bracts lanceolate

greenish, appressed white pilose, exceeded by the calyx; calyx campanulate 9 mm. long, dark from the appressed black pilosity which predominates over the white hairs, sepal lobes linear lanceolate 2 mm. long; flowers apparently a clear yellow, 13–14 mm. long; standard oblanceolate-spatulate bisulcate and somewhat reflexed, shallowly emarginate at the broad tip; wings with a narrowly linear claw equaling the blade, the blade narrowly cuneate-oblong, with two broad rounded nearly equal slightly divergent lobes at the shallowly emarginate tip, the straight basal auricle oblong 2 mm. long, the saccate infolding linear and placed longitudinally above the basal sinus; keel 12 mm. long with a broad oblong claw, the blade folded, bent sharply upwards, concave shield-shaped with minute basal auricles and a prominent beak-like tip; legume sessile 10–13 mm. long, lanceolate in outline long beaked white or somewhat black appressed pilose, dorsal suture somewhat intruded.

Perennis acaulescens, stipulis sparse pilosis, foliolis 23–27, pinnatifidis, 2–8 mm. longis 1–2 mm. latis lanceolatis, scapis appresso-pilosis foliis longioribus, floribus flavis 13–14 mm. longis, legumine lanceolato piloso 10–13 mm. longo.

WASHINGTON: Olympic Mountains, July 20, 1897, *J. B. Flett* 134 (type in Herb. State College of Washington); loose stones and grass, alt. 6000 ft., summit Olympic Mts., Aug. 27, 1898, *J. B. Flett* 803.

The specific name, as is quite obvious, is taken from that of the Olympic Mountains, to which locality the plant seems restricted. *O. olympica* is a member, according to Taubert's treatment in the *Pflanzenfamilien*, of the section *Euoxytropis* and of the series *Orobia*. By Rydberg's treatment, it is a member of the section *Campestres*. This new species is most closely related to *O. luteola* (Greene) Piper, which has oblong softly villous larger leaflets, and flowers 15–17 mm. long. *O. olympica* has appressed pilose lanceolate leaflets, and the flowers 13–14 mm. long.

Oxytropis luteola (Greene) Piper, emend., Fl. N. W. Coast 227. 1915.

Aragalus luteolus Greene, Proc. Biol. Soc. Wash. 18: 17. 1905.

Caespitose herbaceous perennial; tap root stout, freely branching above, bearing numerous crowns; leaves abundant and ample, whitish green; stipules somewhat pilose on the back, at least towards the tip, adnate to the base of the petiole, each half scarious, ovate short acuminate; petioles appressed soft pilose, 1–3 cm. long; leaflets 21–25 the upper pairs opposite, the lower alternate, elliptic or lanceolate-elliptic appressed white villous, 5–15 mm. long, 1–4 mm. wide; scapes several, nearly twice the length of the leaves, somewhat appressed white villous; inflorescence short cylindric, rather loose, with 10–20 divergent or slightly ascending flowers; bracts lanceolate sparsely white villous, half the length of the calyx; calyx campanulate 9–10 mm. long appressed white or somewhat black pilose, the sepal-lobes narrowly deltoid 2 mm. long; flowers apparently a pale clear yellow, 15–17 mm. long; banner with a cuneate claw shorter than the blade, the blade oblanceolate, narrowly emarginate, bisulcate and strongly reflexed; wings with a slender linear claw as long

as the blade, the blade cuneate rhomboidal, diagonally truncate above, the basal auricle incurved 2 mm. long, a short infolded pocket placed longitudinally above the basal sinus; keel folded, the claw oblong twice the length of the blade, the blade bent slightly upwards concave shield-shaped, the basal auricles rather prominent, the caudate tip very prominent; legume white and black appressed pilose, mature pod unknown.

WASHINGTON: Clallam Co., July, 1900, A. D. E. Elmer 2532.

This species is related to *O. gracilis* (A. Nels.) K. Schum., which has the stipules glabrous or glabrate on the back, the bracts equaling and often exceeding the calyx, and the leaves bright green and sparsely appressed pilose. *O. luteola* has the stipules somewhat pilose on the back, the bracts villous half the length of the calyx, and the leaves whitish green with white villous pubescence. *O. saximontana* A. Nels. has the stipules densely long pilose, and the scapes equaling the leaves at anthesis. *O. luteola* has the stipules glabrous below, and the scapes at anthesis nearly twice the length of the leaves.

Oxytropis cascadenis, n. sp.

Caespitose acaulescent perennial; tap root branching above, bearing many crowns; leaves numerous pale green; stipules adnate to the base of the petioles, whitish nearly scarious, each half lanceolate, white pilose along the midrib near the tip; petioles appressed white pilose 2–3 cm. long; leaflets 18–21 odd pinnate, the upper pairs opposite, the lower nearly so, lanceolate to elliptic-lanceolate appressed white pilose, 6–13 mm. long, 2–5 mm. wide; scapes numerous equaling or slightly exceeding the leaves appressed white pilose below as well as more or less black appressed pilose above; inflorescence capitate or very short cylindric even in fruit, 8–12-flowered; bracts lanceolate white appressed pilose, more or less equaling the calyx; calyx campanulate black appressed pilose or with a few white hairs 7–8 mm. long, the sepal-lobes narrowly deltoid 2 mm. long; corolla yellowish 13–14 mm. long; standard spatulate bisulcate and well reflexed, the tip shallowly emarginate; wing with a slender linear claw nearly equaling the blade and at an obtuse angle with it, the blade slightly cuneate oblong with wavy sides, the apex wavy obliquely truncate with a prominent upper terminal lobe and a hint of a rounded sinus and a lower lobe, the basal auricle stout and strongly incurved, 1.5 mm. long, the saccate infolding somewhat diagonal above the base of the auricle, keel infolded with a broad oblong claw exceeding the blade, the blade broadly concave shield-shaped with prominent basal auricles, infolded and somewhat bent upwards, with a prominent caudate apiculate tip, and with large saccate outfoldings placed longitudinally above the base of the basal auricles; pods lanceolate in outline beaked, mostly black though sometimes partly white appressed pilose, 10–13 mm. long, the dorsal suture somewhat intruded, ovules numerous.

Perennis acaulis, stipulis pilosis, foliolis 18–21 lanceolatis pilosis, scapis foliis aequantibus, floribus ochroleucis 13–14 mm. longis, legumine atropiloso 10–13 mm. longo.

WASHINGTON: flowers yellowish, alpine slate ledges, 6700 ft., Grouse Ridge, Mt. Baker, Whatcom Co., Aug. 8, 1923, *Harold St. John* 5113 (type in Herb. State College of Washington); alpine slate ledges, 6700 ft., Grouse Ridge, Mt. Baker, Whatcom Co., Aug. 8, 1923, *Harold St. John* 5101.

This new species from the northern Cascade Mountains resembles *O. Cusickii* Greenm. of the highest Willowa Mts., of eastern Oregon, which species has the stipules glabrous, plant very depressed and low, the leaves 4–8 cm. long, leaflets 7–19, scapes much exceeding the leaves, and the flowers capitate 5–8. *O. cascadiensis* has the leaves 6–15 cm. long, leaflets 18–21, and the flowers 8–12. Dr. Piper determined several collections from Washington as *O. Cusickii* but the writer is unable to agree with this interpretation, and has seen characteristic *O. Cusickii* only from eastern Oregon. The various records for this State of *O. Lambertii* and *O. monticola* are also considered to rest upon misdeterminations. The new *O. cascadiensis* is, according to Taubert's treatment in the Pflanzenfamilien, a member of the section *Euoxytropis* and the series *Orobia*. By Rydberg's treatment it falls into the section *Campestres*.